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AUTHOR Birch, Derek W.; Johnson, F. Craig
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ABSTRACT

A study was conducted using quality control and quality assurance models to examine student outcomes. The purpose was to investigate current quality control and quality assurance practices in six colleges, to evaluate the relationship between quantitative effectiveness measures and qualitative outcomes measure and to assess the readiness of each college to develop its own quality policy. A course data survey and a program review were conducted in each college. The results indicated that the colleges were more ready to make quantitative measurements than they were to use qualitative indicators. The quality control metaphor proved useful in the analysis. (Author)

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QUALITY CONTROL/ASSURANCE IN POST SECONDARY EDUCATION:

AN OUTCOMES APPROACH

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Derek W. Birch

Deputy Director

Further Education Staff College

Coombe Lodge

Blagdon, Bristol BS18 6RG

England

(0761) 62503

F. Craig Johnson

Until September 1, 1988

same address as above

After September 1, 1988

Professor of Educational Research

College of Education

Florida State University

Tallahassee, Florida, 32306

(904) 644 6885

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Teresa Karolewski
Chair and Editor
Forum Publications Editorial
Advisory Committee

Abstract

This study used quality control and quality assurance models to examine student outcomes. The purpose was to investigate current quality control and quality assurance practices in six colleges, to evaluate the relationship between quantitative effectiveness measures and qualitative outcomes measures and to assess the readiness of each college to develop its own quality policy. A course data survey and a program review were conducted in each college. The results indicated that the colleges were more ready to make quantative measurements than they were to use qualitative indicators. The quality control metaphor proved useful in the analysis.

QUALITY CONTROL/ASSURANCE IN POST SECONDARY EDUCATION:

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Background and Overview

In 1980 the Audit Commission for local authorities in England and Wales was charged with securing economy, efficiency and effectiveness in local authorities. Given the Government's intention to reduce and restrict public expenditure, any increase in efficiency was seen as a way to off-set the more debilitating effects of the expenditure cuts. Early in the expenditure reduction process, colleges in England and Wales with net expenditure of about £1500 million were identified as a prime target for possible restrictions. During 1984, audits of 165 colleges were undertaken and the findings were summarized in the Audit Commission's Report Obtaining Better Value from Further Education (1985). The Commission claimed to have identified "value improvement opportunities worth over £50 million per year (or) over £300,000 per college".

The Audit Commission's report had a number of deficiencies and has been the subject of highly critical reviews (see for example Birch and Latcham 1985). Nevertheless, it demanded a response from the Department of Education and Science and from the local authority associations of England and Wales. These two agencies, which were responsible for supporting education at national and local levels, joined together to make their response. The result was a report, Managing Colleges Efficiently, (known as the JES or Joint Efficiency Study) which was published in 1987. A direct line may be traced from the report of the joint efficiency study through a consultative document, Maintained Further Education: Financing, Governance and Law (DES, 1987), to the Education Reform Bill: Part II Higher and Further Education which is currently being debated in Parliament. This Bill, which is expected to become law later this year,

will bring about a significant extension of the financial and managerial autonomy of colleges. In return, colleges will be expected to plan and to control their resources more rigorously than they have in the past.

At the same time a White Paper, Higher Education: Meeting the Challenge, published in 1987, identified the roles of a number of agencies in assuring quality in colleges, and emphasized the need for colleges "to pay more attention to the quality of teaching and learning and to the achievements of students in both academic and employment terms".

This study was thus undertaken against a background of concerns about funding expressed by the Government, efforts of national and local educational agencies to respond to these concerns, and debates in Parliament on pending legislation which promised basic changes in the way colleges planned and used their resources.

Study of Quality: Informal Discussions and Formal Studies

This study began with informal discussions among college administrators who were attending various educational conferences. During the discussions, the topic of quality was introduced, but not defined. After several such discussions it was clear that when ten college administrators sat together to discuss the undefined term "quality" there were at least ten different definitions of the term "quality" including "better than", "better longer", "excellent", "more expensive now, but not over a long time", "of value", "sound", "desired", "dependable", "an art or craft at a high level of detail", "of high market value", or "I feel better about it". However, regardless of how college administrators used the word "quality" in their informal discussions, the process by which they judged quality followed a common process. Their judgement was made beyond the facts, was based on objective evidence, was viewed as being low or high, and was the basis for decisions to act or not to act. Administrative actions included buying, selling, admitting, hiring, remaining, rejecting,

etc. This informal process was also observed when students judged the quality of their courses and took actions. The present formal study of a general quality control process, however, required a more rigorous definition of quality, a model of the process by which quality could be controlled and assured and an evaluation of actual practices to identify those which were not consistant with the model. The definitions and the model grew out of a review of the related literature.

Review of Related Literature

The term "college" in England and Wales referred to colleges of further education. They were similar to community colleges or university professional schools in the United States in that they prepared students to enter the workplace or to pursue advanced education. Evaluation of quality in these colleges was directed toward mastery of goals, fitness for purpose, continuing productivity, adequacy of means and comfort with ends. The exit requirements for these colleges were set by employers, professional standards or institutions offering advanced higher education. One of the major differences was that in the United States the college examinations were written and graded under the direct supervision of the course instructor while in England and Wales the examinations were controlled by external examiners and validating agencies.

Quality in this study was defined in terms of quality control and quality assurance. Harry Knutton, (1982), former Director-General, City and Guilds of London Institute, when addressing "Quality Management in Education", provided some basic elements of the definitions of quality control and quality assurance when he said the following:

> Control is an essential element of management. I use the word as a control engineer. This implies I have sensors at key points in a system and that I am able to take

> corrective action immediately, whenever measureable deviations (positive or negative) occur. This ensures that the relationship between input and output remain as planned. Quality to an engineer, at least, means only one thing: "conformance to requirements" or "Fitness for purpose at an economic cost". Quality Assurance is a positive approach which tries to design things to go right the first time.

This study of quality control/assurance took the definitions from Knutton and agreed with him that applications to education are complex, but that quality can be understood, measured, controlled, assured and managed.

Managing Colleges Efficiently (1987) started by defining effectiveness as "the extent to which objectives are achieved". A problem arose, however, when objectives in education were defined by some colleges in terms of ultimate aims such as "preparation for life". When life was seen as multi-dimensional then some educators only conceded the validity of measurement if it covered all the dimensions. These educators argued that while progress in reading, writing, and arithmetic could be tested, the development of inquiring minds and civic consciousness could not. Yet this development continued over a lifetime and needed to be monitored long after the formal educational processes had been completed. Further, since education was but one factor influencing life chances, colleges would need to unscramble and partition the effects of education from the influences of home and parents, coordinate their activities with the actions of other agencies such as housing and social services, and resolve the "nature versus nurture" debate.

These educational arguements made it necessary to restrict the generalizations of this formal study to indicators of effectiveness and quality within colleges as defined in this study. There was no attempt to generalize the findings to advanced degree granting programs in arts and science colleges where education is more general and assumes more responsibility for "preparation for life". This restriction drew the distinction between teaching and learning in the colleges used in this study. Learning was defined as the product of the student's efforts. Teaching was defined as directing that effort toward specific learning objectives and, in England and Wales, toward national examinations. It was granted that other people influenced the students' learning including parents, peers, and employers who were here identified as the consumers. The outcomes attributed to student development were related to the size, form, relevance and quality of the college programs. It was then possible, with limited generalization, to follow the recommendations of the joint efficiency study group and to use their performance indicators at the following program level of aggregation:

Effectiveness:

1. Student enrollment/target enrollment
2. Students completing/students enrolled
3. Successful students/students enrolled
4. Student progress/students completing

Efficiency:

1. Cost per student enrolled
2. Cost per FTE student
3. Cost per completing student
4. Cost per successful student

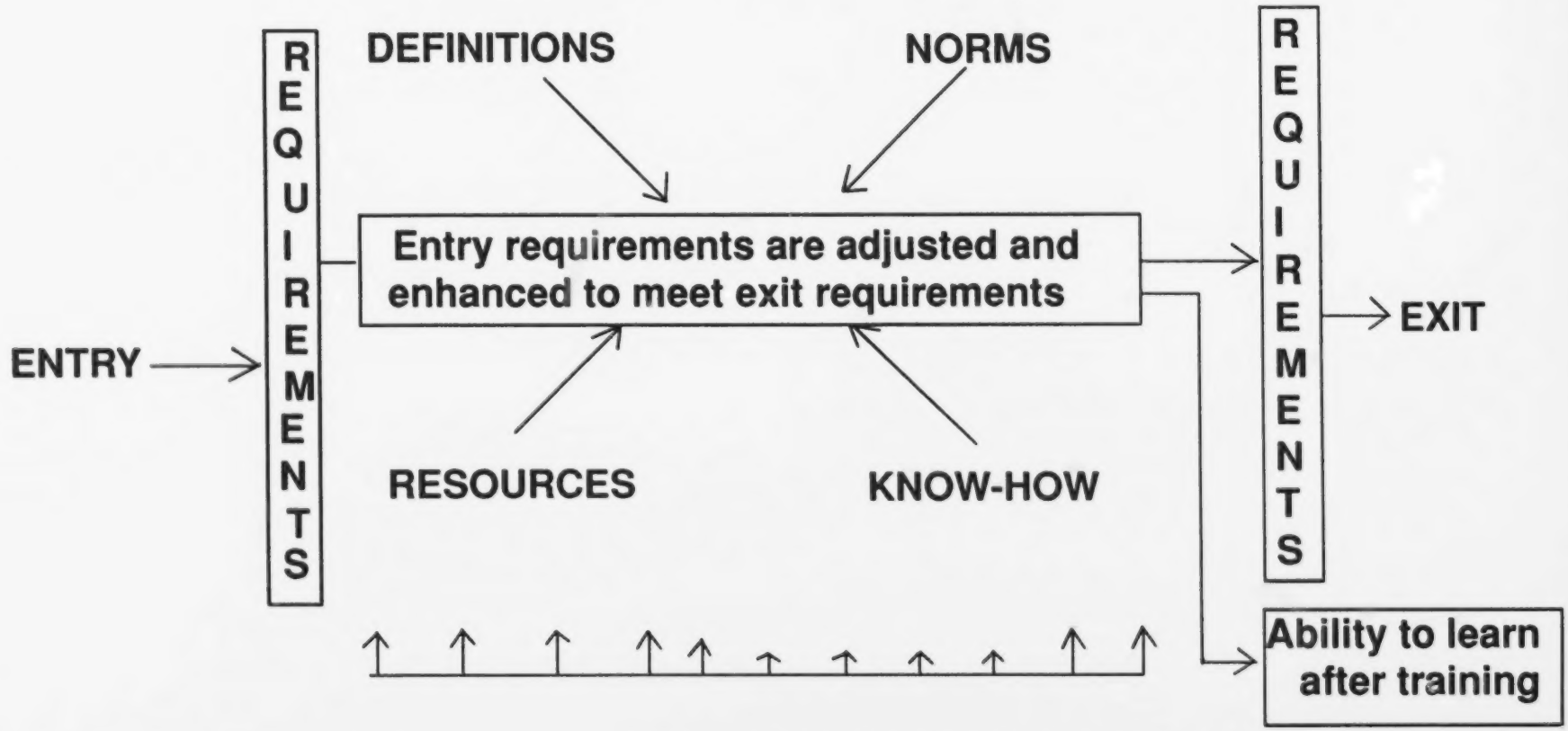
The performance indicators identified above arose by drawing the boundary at a particular point and then choosing to focus upon one variable

rather than another. Only by such simplification was the problem made manageable. The result was perhaps an oversimplification - questions have been begged and assumptions made. In time it may be possible to extend the generalizations, to refine the indicators and to capture more of the complexity. Meanwhile, the college manager's first requirement was to know whether his/her resource plan was OK or not OK in relation to quality concerns expressed by the wider community.

The development of a quality control model from the literature was constrained by the efficiency and effectiveness indicators given above. Colleges in England and Wales will have to report these indicators by 1992 to assure continued funding and it would have been unrealistic to consider models which would fail to accomodate these indicators.

Cossu (1987) contributed the framework for a quality control model for colleges in France. Figure 1 presents an adaptation of the Cossu model to the educational system in England and Wales. The college model reflected exit behavior as largely determined by the entry behavior specified either by employers or by institutions of higher education. The model was based on the quality control metaphor used in industry and had the potential to form a convincing argument for many employers. Arguably the specification of the exit behavior for colleges should rest with employers and with higher education. Further, it was not clear that entry behavior specification should not also be influenced by the requirements of employers and the admission standards for entry into higher education. Certainly the consequences of bad admission decisions lay outside the college. The future resources of all colleges depended in no small way upon satisfying the decision makers in industry, in the professions and in higher education. At the same time, colleges could not afford to abdicate from their responsibility for establishing the clearest specification of end requirements. This study explored the balance between the input into

QUALITY CONTROL MODEL



Repeated measures designed to feed back infromation gaps

Figure 1

the specification and learning outcomes within a system of quality control.

Quality assurance was defined by Cossu as those functions concerned with the attainment of quality which are associated with three cost centers. The first was the cost of not doing it right the first time every time - here called "defects in process". In education this cost is unlikely to be reduced to zero although "zero defect" is the conceptual goal of quality control (Ishikawa 1985). An estimate of this cost may be made by comparing the cost per student enrolled with the cost per successful student in any one year of a course. The other two costs were incurred in trying to reduce the first cost by conducting specific research and development, or by undertaking specific preventive maintenance.

As the Japanese have demonstrated (Ishikawa 1985) the best results in quality assurance were achieved when a concern for quality was demonstrated by everybody in the organization. It was not sufficient to establish procedures for quality control and to designate quality controllers. The commitment to quality needed to be embedded in the collective mentality of the organization. Top managers set the requirements, the information system monitored conformity and the organization structure preserved the system. Operational managers acted on non-conformity and all staff knew their roles. Together they created the appropriate ethos, style and culture.

Central to Cossu's model was a framework on two dimensions of quality: the quantitative or the technical, objective, rational elements of the process which were observed with instruments which used cardinal numbered scales; and the qualitative or the marketing, subjective, reputational promotion of the product which were monitored using ordinal scales. From these two sets of measures a profile was drawn and then the institution was ready to make complete statements of quality which would be seen as credible by the consumers.

In Figure 2 the two dimensions - quantitative and qualitative - have been incorporated into a quality control/assurance measurement matrix which was an adaptation and an extension of Cossu which guided this study. The matrix incorporated the "effectiveness indicators" identified in Managing Colleges Efficiently (1987). Where available, reports of the external examiners and moderators needed to be taken into account, but measurements of quality seemed possible at entry, during the course, at exit and post course. The objective was to close the gaps between the characteristics of the students at entry and the characteristics which are required at exit. A very important question thus became "What are the true requirements of the consumer?" (Ishikawa 1985). In order to probe this question the measurement matrix listed specific instruments were designed to find out how employers and students felt about the result of their college experiences. While this is a rather common practice in community colleges in The United States, it was regarded as somewhat of an innovation in England and Wales. One test of the readiness of a college to build a quality control system thus became, in addition to the joint effeciency study group's effectiveness measures, the qualitative instuments they used to indicate the quality of their product. If all effective measures were used in all programs, if appropriate qualitative indicators were used in all programs, and if the results were understood at all levels in a college, then it could be said that a system of quality control and quality assurance was in place.

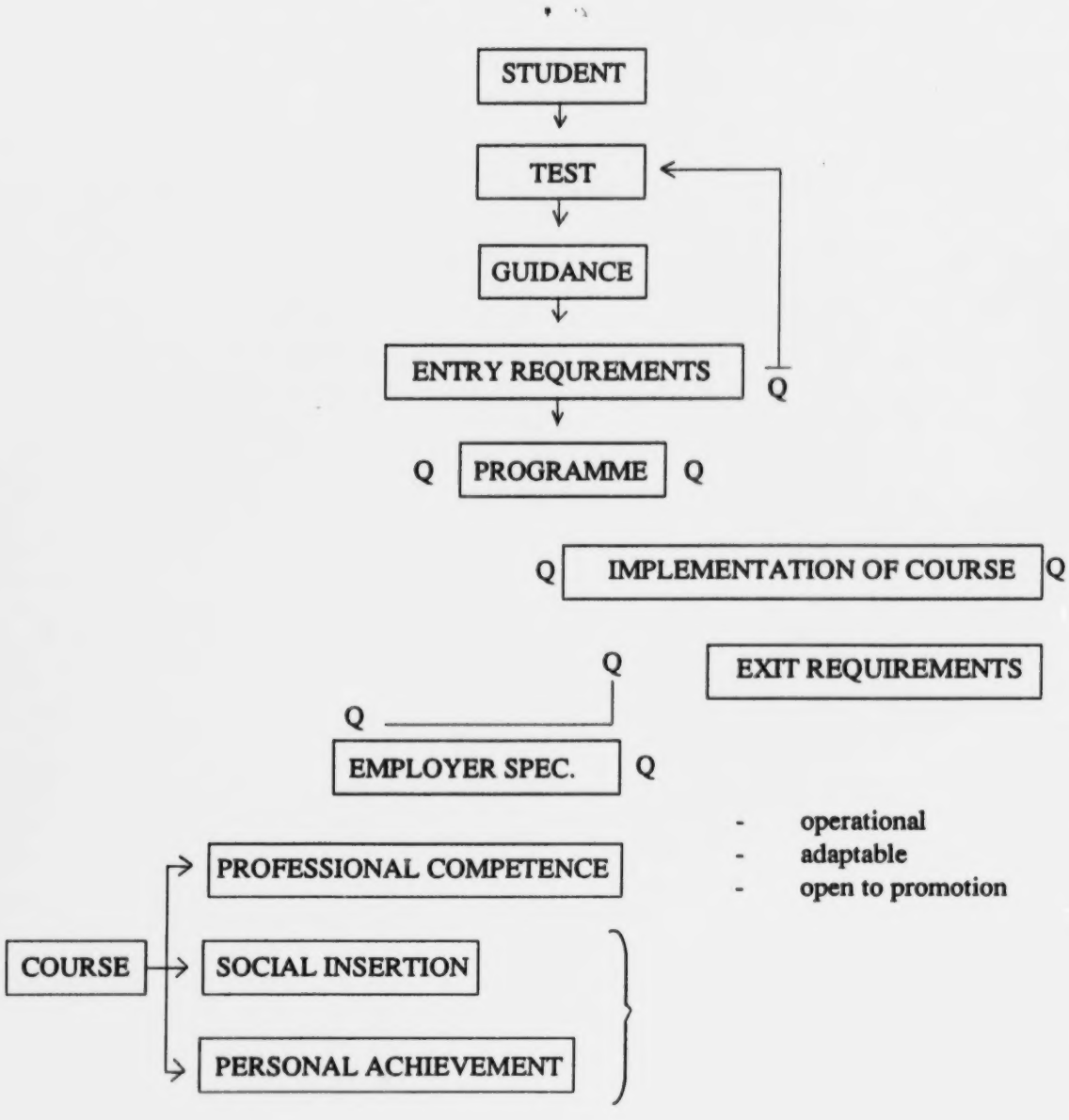
Figure 3 presents Dr. Cossu's model as it was elaborated by him especially for this study. It was an attempt to show the points (Q) in the course design and delivery process where the quality can be measured and what the expectations of students were in terms of professional competence, social insertion, and personal achievement. The opportunities to measure quality were created when there was a discrepancy between the design and

Quality Control/Assurance Measurement Matrix

Quality Dimensions	Measurement Points: Data: Concerns				Purpose	Measurement Processes	
	Entry	During Course	Exit	Post Course		Scale	Instruments
Quantitative Measures	Enrolments Pre-course/ selection tests	Completions Phase tests Formative assessments	Successes Summative tests	Destinations/ Progressions	Research on PROCESS.	Interval scale Cardinal numbers (1,2,3, . . . n)	JBS "Effectiveness" ratios • Enrolments/Target Enrolments • Completions/ Enrolments • Successes/Enrolments • Progressions/ Enrolments Test instruments based on objectives/competences: Criterion - referenced rather than norm - referenced.
Qualitative Indicators	Student motivation to complete	Levels of satisfaction: values related to delivery modes: counselling services; formative assessments; feedback etc.	Levels of satisfaction: assessment methods; integrity of the programme.	Levels of satisfaction: validity of programme in terms of post-course experience.	Promotion of PRODUCT	Ordinal scale. Ordinal numbers. (1st, 2nd, 3rd,) low high	Entry/Exit interviews Value & attitude surveys (students and employers). Instruction ratings.
Quality Statements	Conservation of effort	Mastery of goals	Fitness for purpose	Continued productivity and learning	Adequacy of means and comfort with ends	Combined profile of characteristics	Course Review Periodic studies of the college as an enterprise based in part on a/b results.

Figure 2

Quality Processes of Course Design & Delivery



Relative importance varies:

- from one course to another
- " " institution "
- " " student "

Figure 3

the delivery of a course. These occur, for example, when the entry test does not cover all of the entry requirements or when the implementation of the course exceeds the design of the program. In each case the "fitness for purpose" test can be applied.

The relative importance of the measures vary from one course to another, from one institution to another and from one student to another. These comprised the error terms in this study. The quality process must be operational within an institution, it must be adaptable to the special needs of the institution and it must allow students to be promoted once they leave the institution.

While this study owed a debt to previous research on quality control and quality assurance, it was of special importance to establish the context in which the study would be conducted. Professor William Taylor (1981) issued a warning for all who try to apply the metaphors of quality control and quality assurance to education.

> The power of words is extremely great so we must treat metaphors with great care. Our language is shifting; it is never fixed. That is why a term such as "quality control" can be very dangerous if we do not set it in a particular context in order to derive full meaning from it. If we use "quality control" without scrupulousness as to its meaning we are taking on a vast baggage of technological, industrial and commercial values, beliefs and practices that are essentially inimical to the purpose of our task as educators.

The following statement of the context of this study was written in response to Dr. Professor Taylor's warning.

There were about 450 colleges in England and Wales which provided a

learning environment in which learning was not measured by academic degrees. Many of these colleges were "mixed economy", that is they also provide some advanced education. The students (about 1.8m enrollments represented about 570,000 FTE) pursued their studies through various modes of attendance - full-time, sandwich, block release, part-time day, part-time day and evening, and evening only. The majority were enrolled in coherent programs of study with definite qualification aims. Traditionally the syllabuses and the examinations for these courses were set, administered and assessed by national examining and validating bodies such as the City and Guilds of London Institute, the Royal Society of Arts, the Business and Technician Education Council and the General Certificate in Education at ordinary and at advanced levels. The colleges were owned and controlled by 104 local education authorities, which were partly funded by local property taxes (rates) in that they relied upon central government assistance of either a general kind or in more specific forms. The Manpower Services Commission which reports to the Department of Employment was, three years ago, made the channel for funding about 25% of total expenditure. The statement of context was completed by synthesizing the Government's position into several basic propositions as the inquiry began.

1. Value for money is not synonymous with economy.

2. Employers will be required to be convinced that some system of quality control applies.

3. Overall, colleges are 90% effective, however very few colleges have effective marketing techniques.

4. The ability to measure efficiency and effectiveness is a mark of good management.

5. To be rightly interpreted and used, quantitative data must not be divorced from qualitative assessments.

6. Quality can be judged by looking at academic standards as

reflected by the design of courses, their fitness for purpose, what they require of students and how they meet the needs of employers.

Thus, the literature review provided the basic definitions, the conceptual model, a measurement matrix, the context of the study, and a test for the readiness for a quality control/assurance system within a college. It remained to test the concepts by applying them to six colleges in England and Wales.

Readiness for Quality Measurement in Six Colleges

The test of the readiness to undertake systematic quality control/assurance was defined as the completeness of college effectiveness measures established by the joint efficiency study group, the qualitative measures taken, and the pervasiveness of concerns for quality throughout the institution. The product being tested in the six colleges was the students enrolled in vocational and general education programs. These students were considered as the product in the terms of the quality control and quality assurance metaphor which made it necessary to measure characteristics of students, to observe and to record changes in their behavior and to adjust the educational process when the measurements showed that students were not meeting requirements. The dependent variable was a measure of the amount the student had changed, the independent variable was the amount of change in course characteristics needed to attain a consistant final performance by all students at the end of the course, and the error was the individual differences among students.

The first task was to establish a method for determining how ready a college was to control and assure its quality and to identify areas where special projects were required to get the college ready to make quality statements. The second task was to survey the extent of existing quality control measurement and to describe information systems in six colleges. In order to understand the individual nature the colleges, an estimate of

readiness was made by assessing their commitment to effectiveness by examining their previous reports to the Government and to the joint efficiency study group. Generally, it was difficult to quantify outcomes in terms of the number of crude indicators provided by the Government. Colleges were asked to identify these difficulties and to identify any additional problems which they encountered in the quantification of quality. Each college was then asked to explain how it presently demonstrated quality. Course or program of study could demonstrate quality through several manifestations of both curricular and non-curricular outcomes, including the following: the ratio of enrollments to target places, completion rates, success rates, progression rates (in employment or further courses). It seemed unlikely that claims of quality could be substantiated for any course whose effectiveness ratios fell significantly below national averages or other individually agreed targets.

The quality of the curriculum was next examined under the heading of curriculum development. A survey was made of the aims and objectives of the programs, learning situations, assessment procedures, and program review procedures. In addition, the survey collected data on related non-curricular aspects of environment, accomodation, administration, teaching staff, and non-teaching support. The survey results identified about a dozen aspects which had bearing on a college's justification of quality.

Finally, the quality measurement matrix developed for this study was used to identify a number of specific measures which were refined to reflect circumstances found in each of the six colleges. All six of the colleges were asked to develop a profile so that specific projects on quality control and quality assurance could be proposed for further action. The specific projects included: data collection, maintenance of records, reviews of data, progress reports of student performance, setting target enrollments, management information system data availability and use, collecting and using

student opinions, defining service areas, recruiting students, collecting employer opinions, entry behavior testing, pre-testing for admissions and documentation of quality control systems.

Results of College Quality Control/Assurance Survey

Figure 4 presents the results of the survey of six colleges on four quantitative measures developed from the joint efficiency study group, on four qualitative indicators developed from the literature on quality control/assurance and from course review procedures which were designed to make statements about quality. In general, the quantitative measures used cardinal numbers while the qualitative indicators used ordinal numbers. Both scales were combined to form a profile from which statements of quality were made.

As can be seen from Figure 4, only one college was ready to make the quantitative effectiveness measurements required. Two colleges needed to work on progression/enrollment measures. The remaining three colleges had problems and were not ready to make the required effectiveness measurements.

The qualitative indicators showed that the colleges as a whole were not ready to take these measurements. Instructional ratings were traditionally made for an entire course and there was considerable opposition on the part of unions and other groups who resisted any measurement of instructors' performance by students. Entry and exit interviews had not traditionally been conducted nor had there been a tradition of counseling students regarding either their academic programs or career opportunities. Some student surveys were conducted from time to time in certain full-time courses of study, but there was no consistent measurement of student responses to all the instruction provided by the institution. Relationships with employers were generally maintained through various college and industry committees which met several times during the year. No college regularly surveyed community employment needs to determine what kind of training was best suited

Quality Readiness for Six Colleges
A= Ready B= Possible C= Problematic D= Not Ready

Quality Dimensions	Instruments	College A	College B	College C	College D	College E	College F
Quantitive Measures	Enrl./Target Enrl.	A	A	B	B	A	C
	Completions/Enrl.	A	A	C	B	A	A
	Successes/Enrl.	A	A	B	B	A	A
	Progressions/Enrl.	B	A	D	C	C	B
Qualitative Indicators	Entry/Exit Interviews	B	C	C	C	D	D
	Student Surveys	B	A	C	C	D	A
	Employer Surveys	C	A	C	C	B	A
	Instructional Ratings	D	B	C	C	B	C
Quality Statements	Course Review	C	C	C	B	B	D

Figure 4

to a given area.

It therefore became apparent that no college was ready to make quality statements based upon a complete profile of both the quantitative effectiveness measures and qualitative outcomes indicators. It was also apparent that some progress had been made toward complete statements of quality because of the prior efforts of the colleges in responding to requests from the government and from other agencies. From the initial survey it was clear that there was considerable scope for improving the management of quality in the six colleges involved in this study. Specific projects relating to employer surveys and student responses needed to be undertaken in college A. In order to do this efficiently a system of optical scanning needed to be developed to collect data and to analyze it. A proposal has been made and is currently being reviewed by the Manpower Services Commission. College B has proposed to establish entry and exit testing and counseling procedures. Colleges C and D are working on procedures to improve their existing course review procedures as a focal point for improving the measurement of the qualitative and quantitative aspects of quality. Colleges E and F have proposed studies which relate quality statements more directly to the joint efficiency study group effectiveness measures taken on the quantitative dimension.

Summary and Conclusions

The next step will be to develop a systematic approach by which each college can fit its present quality control/assurance activities into a general model. When this would not be possible, the model would need to be adapted. Through this iterative process a workable model for quality control/assurance for colleges should begin to evolve. The first phase of the research reported here has demonstrated that the quality control/quality assurance metaphor was useful in assessing current strengths and weaknesses of college quality statements.

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